

**CLAIMS:**

1. A method of leach autoclave processing including the steps, in a desired order, of:
  - flashing the autoclave and generating a flashed underflow;
  - performing a solid-liquid separation on the flash underflow slurry to produce a solids fraction and an aqueous fraction;
  - returning at least a portion of the solids fraction to the autoclave; and
  - returning a portion of the aqueous fraction to the autoclave.
2. The method of claim 1, wherein some of the aqueous fraction is returned to the autoclave in the solids fraction.
3. The method of either of claims 1 or 2, wherein some the aqueous fraction is returned to the autoclave in a discrete overflow stream.
4. The method of any one of claims 1 to 3, wherein the autoclave has several compartments and the autoclave flash is obtained from any desired compartment.
5. The method of any one of claims 1 to 4, wherein all of the solids fraction is returned to the autoclave.
6. The method of claim 4, wherein all of the solids fraction is returned to at least one desired compartment of the autoclave.
7. The method of either one of claims 5 or 6, wherein some of the solids fraction is returned directly to the autoclave.
8. The method of either one of claims 5 or 6, wherein an autoclave feed tank is provided upstream of the autoclave and some of the solids fraction is returned to the autoclave indirectly through a desired process upstream of the autoclave.

9. The method of claim 8, wherein the solids fraction is returned to the autoclave feed tank to be further leached and thereby increase the autoclave retention time with respect to the solids fraction.
10. The method of claim 8, wherein the solids fraction is returned to an autoclave feed surge tank upstream of the autoclave feed tank.
11. The method of claim 8, wherein the solids fraction is returned to an autoclave feed density adjust tank upstream of the autoclave feed tank.
12. The method of any one of claims 1 to 11, wherein agitators are provided in the autoclave and the method includes operating the agitators such that they do not limit oxygen mass transfer within the autoclave.
13. The method of any one of claims 1 to 11, wherein oxygen mass transfer in the autoclave is controlled by regulating viscosity using the returned solids fraction.
14. The method of any one of claims 1 to 13, wherein the flash is obtained from a first compartment of a multiple compartment autoclave and the reaction extent in the first compartment is controlled to be in excess of 40%,
15. The method of claim 14, wherein the reaction extent in the first compartment is controlled to be in the range of 85 to 95%.
16. The method of any one of claims 1 to 15, wherein the level of the feed tank upstream of the autoclave is adjusted to compensate for poor density adjustment upstream of the feed tank.
17. The method of claim 16, wherein the level of the feed tank is adjusted to ensure that any out of specification leach product does not pass out of the autoclave.

18. The method of any one of claims 1 to 17, wherein the solid-liquid separation is achieved using at least one of a thickener, a classifier and a filter.

19. The method of any one of claims 1 to 18, wherein the autoclave has multiple compartments and the method includes flashing selected subsequent compartments of the autoclave after the first compartment, the flash slurry obtained thereby being fed to a solid-liquid separation step to produce a solids fraction and an aqueous fraction.

20. The method of claim 19, including feeding the flashed material from the selected subsequent compartments to a solid-liquid separation step to produce a solids fraction and an aqueous fraction, the aqueous fraction of the separation step being fed forwards in the process.

21. The method of either one of claims 19 or 20, including returning the solids fraction from the separation step to the autoclave for further processing at desired conditions relative to the conditions to those prevailing in the initial part of the autoclave.

22. The method of claim 21, including using the autoclave to conduct at least two similar leaching processes within the same pressure envelope with only the compartment dividing walls keeping the processes separate.

23. The method of any of claims 19 to 22, including returning the aqueous fraction to the autoclave for the removal of impurities, the aqueous fraction being fed to a desired compartment of the autoclave.

24. The method of any one of claims 1 to 22, including passing at least a portion of the aqueous fraction to an autoclave discharge tank.

25. The method of claim 22, including flashing the slurry of an intermediate compartment to remove energy and returning the flashed slurry to the same or subsequent compartment of the autoclave

26. The method any one of claims 1 to 24, including directing the flash from the autoclave to a flash tank; directing the flash underflow from the flash tank into a thickener to produce a solids fraction and an aqueous fraction; and feeding the solids fraction to the autoclave for reprocessing.

27. The method any one of claims 1 to 24, including directing the flash from the autoclave into the feed tank, feeding the feed tank underflow to a thickener to produce a solids fraction and an aqueous fraction; and feeding the solids fraction to the autoclave for reprocessing.

28. The method of either of claims 26 or 27, including feeding the solids fraction to the feed tank from where it can be fed with other materials to the autoclave.

29. The method of either of claims 26 or 27, including feeding the solids fraction to a suitable tank upstream of the feed tank.

30. A leach autoclave processing plant comprising: an autoclave feed tank, an autoclave; means to flash the autoclave into a suitable tank in which a feed underflow can be generated; separation means to perform a solid-liquid separation on the feed underflow to produce a solids fraction and an aqueous fraction; and means to return at least the solids fraction to the autoclave.

31. The plant of claim 30, wherein the solids fraction obtained from the separation means is fed to the autoclave via the autoclave feed tank.

32. The plant of either of claims 30 or 31, wherein the suitable tank into which the autoclave flash is directed is a flash tank.

33. The plant of either of claims 30 or 31, wherein the suitable tank into which the autoclave flash is directed is the feed tank.